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REMARKS

The Examiner previously rejected Claim 11 under 35 U.S.C. 112, second paragraph, as being indefinite in the use of the term "swizzle", and failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In response, applicant clarified the claims to avoid this rejection, as well as point out support for such amendment on Page 19 of the originally filed specification.

The Examiner now rejects Claims 1, 11, 13-15, and 19-20 under 35 U.S.C. 112, second paragraph, as being indefinite in the use of the term "swizzle", and failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Moreover, the Examiner now argues that the "term is not defined within the claims or the specification." In response, applicant has clarified the claims to avoid this rejection. Still yet, applicant has provided below an excerpt, which operates with the remaining originally filed disclosure, in defining the claimed "swizzle operation."

"Vector components may be swizzled before use via four subscripts (xyzw). Accordingly, an arbitrary component re-mapping may be done. Examples of swizzling commands are shown in Table 4.

Table 4

.xyzw means source(x,y,z,w) → input(x,y,z,w)
.zzxy means source(x,y,z,w) → input(z,z,x,y)
.xxxx means source(x,y,z,w) → input(x,x,x,x)" (See
Page 19, lines 10-20)

This rejection is thus deemed overcome.

The Examiner has further rejected Claims 1-13, 15-22, 26, 30-34, 37, and 51-52 under 35 U.S.C. 103(a) as being unpatentable over Read, U.S. Patent 5,689,695, and Duluk, et al., U.S. Patent 6,597,363. Applicant respectfully disagrees with such rejection.

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Independent Claims 1, 13-15, and 19-20 will first be addressed. In response to applicant's most recent previously-submitted amendments, the Examiner states that 1) applicant nowhere defines the term "swizzle" with specificity, and 2) Read discloses a swizzle operation on col. 81, lines 33-46 thereof. With respect to the Examiner's first point, applicant emphasizes that the claimed "swizzle operation" is now defined in additional specificity, as clearly supported in the originally filed specification (see excerpt above). In particular, now claimed is "a swizzle operation [that] is performed for component re-mapping by indicating a manner in which a plurality of source vector components are re-mapped as a plurality of input vector components." Moreover, with respect to the Examiner's second point, applicant notes that nowhere in the following excerpt from Read is there any sort of "swizzle operation" specifically for "component re-mapping ... indicating a manner in which a plurality of source vector components are re-mapped as a plurality of input vector components" (emphasis added).

"This combined register A14/A6 will generally be used as a stack pointer. Note that stack operations are only allowed on aligned 32 bit word boundaries. Consequently the two least significant bits of combined register A14/A6 are hardwired to "00". Writing to these two bits has no effect and they are always read as "00". Registers A7 and A15 are also embodied by the same hardware and both global address sun-unit 610 and local address unit 620 may use this combined register in the same instruction. Register A7 is accessible to local address unit 620 and register A15 is accessible to global address unit 610. Combined register A15/A7 is hardwired to all "0's"."
(col. 81, lines 33-46)

The Examiner further admits that Read does not teach applicant's claimed "component re-mapping," and continues by relying on the following excerpt from cols. 91-104 of the Duluk reference to make a prior art showing of applicant's claimed "component re-mapping." See, for example, the excerpt from the Duluk reference below.

"Vector Interpolation

For bump mapping the normal and surface tangents may have a magnitude associated with directional unit vectors. In this case we interpolate the unit vector components separately from the scalar magnitudes. This apparently gives a better visual result than interpolating the x, y and z components with their magnitudes. This is especially important when the direction and the magnitude are used separately.

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FIG. 60 shows how interpolating between vectors of unequal magnitude results in uneven angular granularity, which is why we do not interpolate normals and tangents this way." (col. 98, lines 15-21)

It appears that the Examiner is relying on the interpolation procedure of Duluk to meet applicant's claimed "swizzle operation for component re-mapping." For the convenience of the Examiner, below is a dictionary mathematical-related definition for "interpolating."

in·ter·po·late

v. in·ter·po·lat·ed, in·ter·po·lat·ing, in·ter·po·lates

v. tr.

1. To insert or introduce between other elements or parts.
2.
 - a. To insert (material) into a text.
 - b. To insert into a conversation. See Synonyms at introduce.
3. To change or falsify (a text) by introducing new or incorrect material.
4. Mathematics. To estimate a value of (a function or series) between two known values.

Source: The American Heritage® Dictionary of the English Language, Fourth Edition
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Clearly, "interpolation" fails to meet "component re-mapping," as interpolation merely estimates a value between two known values. Thus, interpolation does not re-map components. To further emphasize this distinction, applicant now claims a "swizzle operation" for "component re-mapping ... indicating a manner in which a plurality of source vector components are re-mapped as a plurality of input vector components" (emphasis added).

Only applicant teaches and claims such a swizzle operation, as specifically claimed, in the context of a programmable instruction set with "branching" and/or "condition codes."

To further emphasize this distinction, applicant now claims a swizzle operation [that] is carried out utilizing: ".xyzw which means source(x,y,z,w) → input(x,y,z,w); .zzxy which means source(x,y,z,w) → input(z,z,x,y); and .xxxx

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which means $\text{source}(x,y,z,w) \rightarrow \text{input}(x,x,x,x)$ (or similar language). Note new Claims 54 and 55.

With respect to dependent Claim 11, applicant emphasizes that a further distinction is further emphasized. In particular, only applicant teaches and claims the specific "swizzle operation," as claimed above, which is uniquely applied to "condition codes," as claimed.

With respect to independent Claim 21, the Examiner, in his recent response, makes a blanket statement that Read does disclose the claimed at least 10 operations. To support this assertion, the Examiner attempts to make a prior art showing of many of applicant's claimed operations. After a careful review of the excerpts relied upon by the Examiner, applicant's asserts that the Examiner has merely found the following "words" in Read's description: branch operation, a call operation, a cosine operation, move, multiply, addition, minimum, and maximum operations. Applicant asserts that the gleaned "words" fall short of applicant's claims. For example, the disclosure of the "less than" and "greater than" in Table 41 (see below) does not meet applicant's claimed "set-on-greater-than," set-on-less-than," etc. (emphasis added).

TABLE 41

Condition field bits 5 4 3 2	Mnemonic	Condition Description	Status bits Comparison
0 0 0 0	u	unconditional	—
0 0 0 1	p	positive	~NA~Z
0 0 1 0	ls	lower than or same	~CZ
0 0 1 1	hl	higher than	CZ~Z
0 1 0 0	lr	less than	(NA~V)~(NA~V)
0 1 0 1	lo	less than or equal to	(NA~V)~(NA~V)Z
0 1 1 0	gr	greater than or equal to	(NA~V)~(NA~V)
0 1 1 1	gt	greater than	(NA~V)~(NA~V)Z
1 0 0 0	ls, c	lower than, carry	C
1 0 0 1	ls, nc	higher than or same, no carry	~C
1 0 1 0	eq, z	equal, zero	Z
1 0 1 1	ne, nz	not equal, not zero	~Z
1 1 0 0	v	overflow	V
1 1 0 1	nv	no overflow	~V
1 1 1 0	n	negative	N
1 1 1 1	nn	non-negative	~N

(col. 115)

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Thus, applicant first asserts that this showing falls short of the claimed "at least (10)." Secondly, applicant asserts that the Examiner has taken some of Read's words out of context. For example, the Examiner relies on the following excerpt to show applicant's claimed "minimum," and "maximum" operations.

"Comparison 1067 finds the minimum and maximum of MaxMin and MinMax. Comparison 1068 determines the minimum of the maximum of comparison 1067 and MedMed." (see col. 152, lines 51)

Unfortunately, such excerpt merely describes a comparison operation to find a minimum and maximum. Clearly, such use of the words minimum and maximum are not referring to "operations [that] are programmable by a user utilizing instructions from a predetermined instruction set," as specifically claimed by applicant. Again, applicant's claimed invention involves a unique instruction set of programmable operations, found nowhere in the prior art.

To further emphasize this distinction in a manner that further distinguishes Read, applicant now claims "at twenty (20)" operations selected from the group consisting of those set forth in Claim 21 (emphasis added). A notice of allowance or a specific showing of such specific "programmable operations" of an "instruction set" is respectfully requested.

Applicant emphasizes that such a specific set of at least twenty (20) of such specific operations provides an enhanced "computer graphics pipeline" that is capable of accomplishing advanced tasks not envisioned at the time of Read, in a programmable manner. Simply nowhere in the prior art is there such a combination of features for fulfilling the foregoing objectives. A specific showing of such combination of operations or a notice of allowance is respectfully requested.

With respect to the rejection of independent Claims 34, and 51-52; applicant respectfully disagrees and emphasizes that subject matter of independent Claims 22, and 31 – 33 has been incorporated into Claims 34, and 51-52. Independent Claims 34, and 51-52 are thus now deemed allowable for the reasons set forth hereinbelow.

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The Examiner has further rejected Claim 14 under 35 U.S.C. 103(a) as being unpatentable over Read, U.S. Patent 5,689,695 and Duluk, et al., U.S. Patent 6,597,363, and further in view of Deering, U.S. Patent 5,517,611. Such Claim 14, however, includes the subject matter deemed allowable for the reasons set forth hereinabove, and is thus deemed allowable.

The Examiner has further rejected Claims 23-25, 27-29, 35-36, 38-50 and 53 under 35 U.S.C. 103(a) as being unpatentable over Read, U.S. Patent 5,689,695 and Duluk, et al., U.S. Patent 6,597,363, and further in view of Choe, et al., U.S. Patent 6,385,632. Applicant respectfully disagrees with such rejection, especially in view of the amendments made hereinabove.

With respect to independent Claims 22, and 31 – 33; the Examiner admits that Read does not disclose applicant's claimed "mathematical function [that] is a function in which an initial n derivatives are tabulated and accessed via an interpolation operation," but then relies on col. 78, line 60 – col. 79, line 67; as well as col. 97-99 from Duluk to make a prior art showing.

It appears, however, that the Examiner has not taken into consideration the full weight of applicant's claim language. In particular, such excerpts fail to show any sort of mathematical function in which an initial n derivatives "are tabulated and accessed via an interpolation operation" (emphasis added). It appears that the Examiner has found a disclosure of multiple "derivatives," but has not found any derivatives that are specifically tabulated and accessed using interpolation.

In fact, the only mention of a table or interpolation in Duluk is, for example, in Claim 1, where it discloses a "lookup table determining lower bits of an interpolation location, an input of the lookup table comprising the sample mask, the interpolation location having sub-pixel accuracy." Such table includes "locations," not derivatives. Moreover, the "locations" themselves are "interpolated," instead of interpolation being used for "tabulation" and "access," as claimed.

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It appears that the Examiner is simply gleaning similar words out of context to meet applicant's claims. This is improper. A notice of allowance or a specific showing of the foregoing specifically called-out limitations is respectfully requested, in the context of the remaining claim limitations.

With respect to Claim 53, the Examiner makes a blanket statement in his latest remarks that the references Read, Duluk and Choe together teach all of the features of the claim. However, it appears that the Examiner has still not addressed, with any sort of specificity, the subject matter of Claim 53, which was emphasized previously.

For example, in none of the references relied upon by the Examiner is there any sort of method for executing a function including:

"identifying a sign, an exponent, and a mantissa associated with the input data utilizing the computer graphics pipeline,"

"normalizing the input data utilizing the computer graphics pipeline,"

"if the function includes an exponent function, executing a barrel shift operation on the input data utilizing the computer graphics pipeline,"

"if the function includes a cosine function, adding a one (1) to the phase of the input data utilizing the computer graphics pipeline,"

"if the function includes at least one of a sine function and a cosine function, multiplying the input data by $(1/(2\pi) + 1)$ and performing a conditional 1's complement operation on the input data utilizing the computer graphics pipeline,"

"extracting a set of most significant bits and a set of least significant bits from the mantissa associated with the input data utilizing the computer graphics pipeline,"

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"adding a one (1) to the most significant bits utilizing the computer graphics pipeline,"

"looking up a plurality of derivatives based on the most significant bits utilizing the computer graphics pipeline," and

"calculating a Taylor Series with the derivatives and the least significant bits utilizing the computer graphics pipeline," etc.

An allowance or a specific showing in the prior art of these specific elements is therefore respectfully requested.

All of the independent claims have thus been addressed and are deemed allowable for the reasons set forth hereinabove. By virtue of their dependence, any claims dependent therefrom are now deemed allowable.

For payment of the fees due in connection with the filing of this paper, the Commissioner is authorized to charge such fees to Deposit Account No. 50-1351 (Order No. NVIDP055/P000369).

Respectfully submitted,

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